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UNITED STATES DISTRICT COURT

DISTRICT OF OREGON

PENDLETON DIVISION

WESTERN WATERSHEDS PROJECT, CENTER FOR BIOLOGICAL DIVERSITY, and **WILDEARTH GUARDIANS** Plaintiffs, **v.** **DAVID BERNHARDT**, Secretary of the Interior, **JEFFERY A. ROSE,** District Manager, Burns District, Bureau of Land Management, and **BUREAU OF LAND MANAGEMENT**, Defendants.	**Case No.: 2:19-CV-750-SI** **DECLARATION OF TAMZEN K. STRINGHAM, Ph.D.**

I, Tamzen K. Stringham, hereby declare and state:

1. I am a rangeland and riparian scientist with extensive experience in the Great Basin generally and in the Steens Mountain area more specifically. In particular, I have been studying

riparian and sagebrush ecology and livestock management on Steens Mountain since 1998. I have a B.S. in Economics from California State University-Chico (1979), a M.S. in Agricultural Economics from Oregon State University (1982), and a Ph.D. in Rangeland Resources from Oregon State University (1996). I am a Department Chair of Agriculture, Veterinary and Rangeland Sciences Department at the University of Nevada, Reno (UNR). I also hold the Donna Anderson Endowed Professorship in Grazing and Rangeland Management. I have been affiliated with the University of Nevada, Reno (UNR) since 2008. From 1997-2008, I was assistant/associate professor in the Rangeland Resources Department at Oregon State University. I have been a Certified Professional in Range Management, Society for Rangeland Management since 2000. I am also the owner of Riparian and Rangeland Services, LLC, a small consulting business focused on the restoration, management and monitoring of riparian and rangeland ecosystems in the Great Basin. I have provided such services for private entities and government agencies interested in improving sage grouse and riparian habitat in the Great Basin area. Attached to this declaration as Attachment A is my curriculum vitae.

2. My research, teaching (both classroom and professional development), and consulting activities have been specifically focused on the ecology, management and restoration of the sagebrush ecosystems of the Great Basin, including riparian ecosystems. I developed and continue to teach the graduate-level Riparian Restoration Ecology class at UNR and I teach the Rangeland Restoration Ecology class, both classes I also taught at Oregon State University. In addition, I teach at least one multiple-day workshop per year for public land management employees and private land managers on the topic of rangeland or riparian ecology and the tools developed from science for managing rangelands or riparian systems in an ecologically sustainable manner. My efforts in this area resulted in the USDA Secretary of Agricultural

Honor Award (2013).

3. Specific to Steens Mountain, I began research and management projects on the stream channels on or in the immediate vicinity of Steens Mountain in 1998. Topics included stream temperature related to vegetative shading, groundwater influence on stream temperature, quantification of willow species distribution utilizing remotely acquired imagery, quantification of willow browse by deer, restoration of aspen and willow stands using brush fences, restoration of tui chub habitat, impact of western juniper on watershed hydrology and vegetative characteristics and livestock management on riparian and upland plant communities. I have had two Ph.D. students and five M.S. students complete their dissertations or theses on subjects studied specifically on Steens Mountain. Publications of interest from these efforts (*indicates graduate student as senior author):

*Hopkins, K. and T.K. Stringham. 1999. The thermal patterns of type C and E streams of eastern Oregon: 1998 and 1999 data summary. Pp. 140-161 IN: W.C. Krueger, T.K. Stringham, and C.E. Kelley (compliers), Environmental Impacts on Stream Temperature. Final Report to the Governor's Watershed Enhancement Board, Nov. 30, 1999. Dept. of Rangeland Resources, Oregon State University, Corvallis.

*Matney, C.A., T.K. Stringham, C.S. Boyd and R. Gresswell. 2003. Great Basin redband trout (Oncorhynchus mykiss newberrii) habitat improvement using felled Western juniper (Juniperus occidentalis). Range Science Series Report #6, Dept. of Rangeland Resources, Oregon State University, Corvallis.

*Taylor, G.I., T.K. Stringham and W.C. Krueger. 2003. Irrigation as a tool for stream temperature management. Range Science Series Report #6, Dept. of Rangeland Resources, Oregon State University, Corvallis.

*Carr, C., T.K. Stringham and D. Thomas. 2003. The influence of environmental and physical factors on the thermal patterns of headwater streams. Range Science Series Report #6, Dept. of Rangeland Resources, Oregon State University, Corvallis.

*Petersen, S.L., T.K. Stringham and A. Laliberte. 2005. Classification of willow species using large scale aerial photography. Rangeland Ecology and Management 58:582-587.

*Matney, C.A., C.S. Boyd and T.K. Stringham. 2005. Use of felled junipers to protect willows from browsing. Rangeland Ecology and Management 58:652-655.

*Petersen, S.L., T.K. Stringham, and B.A. Roundy. 2009. A process-based application of state-and-transition models: A case study of western juniper encroachment. Rangeland Ecology and Management 62(2):186192.

*Petersen, S.L. and T.K. Stringham. 2008. Infiltration, runoff, and sediment yield in response to western juniper encroachment in southeastern Oregon. Rangeland Ecology and Management 61:74-81.

*Petersen, S.L. and T.K. Stringham. 2008. Development of GIS-based models to predict plant community structure in relation to western juniper establishment. Forest Ecology and Management 256:981-989.

*Petersen, S.L. and T.K. Stringham. 2009. Intercanopy community structure across a heterogeneous landscape in a western juniper encroached ecosystem. J. of Vegetation Science 20:1163-1175.

4. I have conducted research and implemented restoration and management projects in both riparian and upland systems in other locales within Oregon and the Great Basin. I currently have ongoing riparian research involving the interactions of sage grouse, livestock and wild horse management in the Desatoya Mountains, NV (PI: Desatoya Mtn and Dalton Meadows Projects),

and am also conducting or overseeing research on the respective effects of long-term livestock exclusion as opposed to appropriate livestock management on Maggie Creek, NV (PI: Conserving Soil Carbon and Sage Grouse Habitat in Great Basin Meadows). The following publications are relevant to my research in these subject-matter areas in locales other than Steens Mountain:

*Lowson, K., J. C. Buckhouse, T.K. Stringham and C.S. Boyd. 2003. Effects of planting location on survival and growth of Booth's willow plantings. Range Science Series Report #6, Dept. of Rangeland Resources, Oregon State University, Corvallis.

Stringham, T.K. and M. Borman. 2005. Riparian Plant Fact Sheets. Dept. of Rangeland Ecology and Management, Oregon State University. http://oregonstate.edu/dept/range/riparian-plant-fact-sheets.

Stringham, T.K. and S.E. Quistberg. 2008. Seven Mile and Crooked Creek Monitoring Summary: Final Report for USDA, NRCS Wood River CEAP project. 128p.

* Freese, E.A., T.K. Stringham, and J.C. Miller. 2009. Relationships between insect abundance and plant community characteristics for sage-grouse brood-rearing habitat. Corvallis, Oregon: Oregon State University Beef Research Report.

Stringham, T.K. and S.E. Quistberg. 2008. Wood River Valley Vegetation Monitoring Summary 2007-2008: Final Report for USDA, NRCS Wood River CEAP project. 54p.

Stringham, T.K. 2010. Sprague River Riparian Vegetation & Channel Monitoring 2008-2009: Final Report for Klamath Tribes Contract # 92-BOR11-08-2. 204p.

Stringham, T.K., W.C. Krueger and D.R. Thomas. 2001. Application of non-equilibrium ecology to rangeland riparian zones. Featured Article. J. Range Management. 54:210-217.

Stringham, T. K., J.C. Buckhouse and W.C. Krueger. 1998. Technical Note: Stream temperature

as related to subsurface water flows originating from irrigation. J. Range Management 51:88-90.

*Quistberg, S.E. and T.K. Stringham. 2010. Sedge transplant survival in a reconstructed channel: Influences of planting location, erosion and invasive species. Restoration Ecology 18(s2):401-408.

Freese, E.A., T.K. Stringham, G. Simonds, and E. Sant. 2013. Grazing for fuels management and sage grouse habitat maintenance and recovery: A case study from Squaw Valley Ranch. Rangelands 35(4):13-17.

Stringham, T. K. and J.P. Repp. 2010. Ecological Site Descriptions: Considerations for Riparian Systems. Invited Paper. Rangelands 32(6):43-48.

Svejcar, T., T. K. Stringham, B. Perryman, C. Marlow, J. Derner, L. Vermeire, K. Havstad, M. Borman, K. Launchbaugh, M. George, K. Tate, C. Call, G. Frasier, B. Roundy, G. Ruyle, K. Jensen, J. Tanaka, R. MataGonzalez, S. Swanson, T. Deboodt, J. Bates, C. Boyd, K. Davies, M. Madsen, R. Sheley. 2014. Western Land Managers Will Need All Available Tools for Adapting to Climate Change, Including Grazing: A Critique of Beschta et al.1. Environmental Management 51:474-491.

Carroll, R.W.H., J.L. Huntington, K.A. Snyder, R. Niswonger, C. Morton, T.K. Stringham. 2016. Mountain meadow groundwater response to climate and upland vegetation in a Great Basin watershed. Ecohydrology: 1-18. DOI 10.1002/eco.1792

5. I have dedicated my professional career to developing sound science and management knowledge for western rangelands. The importance of rangeland riparian areas to fish and wildlife is not debatable, nor is the importance of public rangeland grazing to the economic health of rural Oregon. The Oregon Department of Agriculture (2018) reports cows and calves as the number two most important agricultural commodity produced in the state with the

majority of the animals being raised east of the Cascades. Furthermore, 97% of the beef produced in Oregon is raised on family-owned farms. Research has shown that riparian function, wildlife and livestock can co-exist on the landscape with appropriate management.

6. In preparing this declaration, I reviewed the Declaration of Boone Kauffman (Dkt. #9) and associated materials that Plaintiffs submitted in support of their motion for preliminary injunction in this case.

7. Dr. Kauffman, in his declaration, adequately discusses the legacy grazing impacts that much of the western rangelands were subjected to through settlement times until the passage of the Taylor Grazing Act of 1934 and the formation of the Bureau of Land Management (BLM) in 1946. Significant damage occurred to many riparian areas in this period, as shown in the photos of Barnhardy Meadow, Cabin Fork of Rock Creek on Hart Mountain in 1990 (Kauffman declaration). BLM manages over 260 million acres in the United States, or one-eight of the country's land mass, but it was not until 1976 with the passage of Federal Land Policy and Management Act (FLPMA) that BLM was granted new authorities, including designation of areas of critical environmental concern including riparian areas, to be included in their multiple use planning documents (Ross 2006). Inventory of such areas, development of ecological understanding and implementation of management takes time. In 1996, BLM developed the National Riparian Service Team, specifically for addressing riparian management concerns on the nation's rangelands. The management of the 1990's depicted in the photos of the Kauffman declaration is not the management in place today on Hardie Summer Allotment or the areas of Steens Mountain I have inventoried or observed, which include Skull Creek, Little Skull Creek, Bunny Creek, Home Creek, Cucamonga Creek, Kiger Creek, Mud Creek, Blitzen River and Big Fir Creek.

8. The 1990 photos provided by Dr. Kauffman were taken 14 years after passage of FLPMA. The initial response, back in the 1990's, to riparian areas in such degraded conditions as Barnhardy Meadow was to permanently remove livestock grazing. Today, there are other examples to show appropriate livestock management can co-exist with healthy functioning stream channels. As an example, below are photos taken in 1980, 2000, 2008, and 2017, respectively, at or near the same location at Maggie Creek, NV, where I have done field work. The pasture in which the photos are taken is grazed for a period of time every August, September, and October,

9. Dr. Kauffman cites a paper by Roath and Krueger (1982) on livestock preference for

riparian areas. He cites without context the conclusion that as much as 81% of forage removed by cattle can come from the riparian area. To provide some appropriate context for this finding, the paper specifically states that "a combination of management and physical topographic constraints caused cattle to concentrate on the riparian zone early in the grazing season in 1977 and 1978" (abstract) and further addresses the livestock herding practices that encouraged riparian use by livestock. Indeed, the intent of the paper was to investigate livestock management practices that facilitate the excessive use of riparian areas by cows and to provide management with knowledge of how to improve livestock management for riparian grazing.

10. Dr. Kauffman further generalizes that all forms of livestock grazing causes long-term destruction or degradation of riparian conditions, which the example I provided above shows is incorrect. Rather, grazing must be evaluated in terms of season of use, frequency or use and duration of use. All of these are management options. In addition, Dr. Kauffman, as of the date of his declaration, had not visited the Hardie Summer Allotment, and therefore his suppositions concerning overbank flow to recharge water tables, deposit rich sediments onto adjacent floodplains, etc. are out of context with the channel morphology of Big Fir and Little Fir Creeks where they flow through the Hardie Summer Allotment. The same is true, and for the same reasons, for the projections he makes as to the effects "ongoing grazing practices" will cause in paragraph 15 of his declaration. Channel function in regard to width/depth and overbank flows are largely a function of channel type (Rosgen 1996, 2006). Concerns with shading, channel form and streamside vegetation are broadly framed comments that reflect Dr. Kauffman's generalized understanding of the historical and no longer prevalent grazing management that occurred on some areas of the western landscape.

11. Dr. Kauffman states he has quantified riparian/ecosystems in eastern Oregon such as

Blitzen River and he cites Kauffman et. al. 2003 (not cited). He states he is confident that this channel is quite close, lying to the west, of the allotments at issue and makes the assumption it should therefore represent the channels he had not yet observed. This would appear to represent an unsupported and overly broad assertion, as these creeks may have different hydrologic characteristics, as well as different management histories. Nor does Dr. Kauffman provide any evidence that Blitzen River exhibits a similar channel form or a similar management history.

12. Livestock management within riparian ecosystems is influenced by topography (Roath and Krueger 1982) and management inputs such as fencing and off-site water locations. Topography influences channel type (Rosgen 1996, 2006). The steeper the channel and more rock- or boulder-lined the channel is, the less access livestock have to the waterway, and thus, the more resilient the system is to livestock use. In other words, not all creeks are the same. The photos included in Dr. Kauffman's declaration are characterized as Rosgen E or C type channels, which are those most sensitive to degradation by inappropriate livestock management, with E type channels being the easiest to degrade. The channels within the Hardie Summer Allotment are primarily Rosgen B type channels, with short reaches of higher gradient A type channels as well. These channel types are higher gradient creeks, typically with step-pool morphology and gravel, cobble or boulder bed material, leading to channel banks that are less sensitive to disturbance (Rosgen 1996, 2006).

13. To provide more specific context for my comments and opinions as to the likely effects of livestock grazing in the Hardie Summer Allotment as has occurred in the recent past, I made a site visit to Big Fir Creek on June 19, 2019, with BLM personnel. I also examined a series of photos that BLM has taken of the Little Fir Creek in the Allotment. During the site visit, the following points and observations were noted or discussed:

a. Hardie Summer Allotment encompasses 3775 privately owned acres and 6008 public owned acres for a total of 9783 acres. The allotment is divided into 5 pastures. Permitted use is July 1 through September 30th. Off-stream water is provided.

b. Big Fir Creek within the Hardie Summer Allotment is contained within a Rosgen Valley Type VI, a fault-line valley and is structurally controlled being dominated by bedrock and/or colluvial slope building processes (Rosgen 1996, 2006). Stream pattern is controlled by the confined, laterally controlled valley. Rosgen stream type typically found within this valley type is "B".

c. Observations of Big Fir Creek confirmed the dominant channel type to be characteristic of a Rosgen B channel type with short reaches of "A" type channel. B Channels are moderately entrenched, moderate gradient, riffle-dominated channel, with infrequently spaced pools. B Channels exhibit gradients of 2 to 4%, sinuosity >1.2 with entrenchment ratios between 1.4-2.2.

d. Observations of Big Fir Creek confirmed a Rosgen B type channel with a boulder, cobble, and gravel substrate. On rare occasion the channel gradient increased above 4-5% indicating a Rosgen A type channel.

e. Vegetation on the stream banks and floodplain was predominately aspen and willow with an understory of grasses, forbs and occasional sedges. The high gradient channel and substrate of boulders, cobbles and gravels indicate the creek requires woody species such as willows and aspen for stability. Herbaceous species such as sedges are not important to streambank stability.

f. The woody vegetation exhibited multiple age classes. Aspen stands had all ages represented from trees less than 5 years old (indicating recruitment without livestock present) to trees in the 5-10 year range indicating recruitment during the recent past with livestock present. Willows did not exhibit the "mushroom shape" or highlining common of willows that have been

over utilized in the past or present by livestock or wildlife.

g. Small floodplain areas where the channel has access to out of bank flows showed no signs of hoof damage (pugging) from past livestock use.

h. Observations of livestock /wildlife water crossings were present. Crossings were infrequent and the channel bed material of gravel and cobble armors the channel from significant impact. Livestock impacts of trailing up and down the channel or of loafing near the channel were not evident.

i. The Hardie Summer Allotment has five pastures and off-site water. The aspen riparian forest and willow-lined channel indicate generally excellent management of livestock grazing has occurred within this allotment in the recent past for many years. Aspen stands reflect multiple age classes. Channel form and streamside vegetation and bank integrity was in good to excellent condition. BLM has a history of Proper Functioning Condition (PFC) assessments dating back to 1999 indicating the system has met or exceeded the PFC rating every time it has been assessed. This allotment demonstrates successful riparian and upland rangeland management and BLM should be commended for their management of this particular area. BLM has provided the necessary infrastructure for appropriate livestock distribution with 5 pastures and off-site water. This infrastructure insures no one area will be utilized for more than 3-4 weeks (likely less) for the duration of the grazing period. Livestock do not have to water at the channel as water is provided elsewhere away from the channel. BLM has implemented the necessary livestock management tools for a successful allotment grazing plan.

j. Channels in Hardie Summer are Rosgen B – armored with boulders, cobbles and gravels. Overhanging banks are not part of channel.

k. Soil compaction not apparent and not measured.

l. Woody (willow and aspen) community has multiple age classes and vigorous. Negligible to no evidence of general issues suggested by Dr. Kauffman in his declaration.

m. Riparian plant community is generally vigorous and healthy and older than the five year rest from grazing. Channel is not widening and exhibits the pattern, profile and dimensions of a Rosgen B system.

n. Channel is in potential natural community status with evidence of areas where large ungulates (livestock, elk, deer) cross the channel. Channel crossings are widely dispersed and small in size.

o. No observable degradation of any meaningful magnitude to fish habitat or riparian function.

p. Mountain sagebrush and low sagebrush areas in Hardie Summer allotment were also visited. I estimated that mountain sagebrush cover was in the 25-35 percent range as I would measure it on a continuous line transect. Excellent native grass and forb cover was observed in interspaces and under shrubs. Discussions of grazing untilization with BLM indicated livestock use is prescribed at 50% utilization. However, with the amount of forage available the utilization with the number of AUMs and amount of forage suggests will likely be in the 20% range.

SUMMARY OF FIELD VISIT

14. Big Fir Creek which runs within the Hardie Summer Allotment for 3.1 miles (1.8 miles public), is contained within a Rosgen Valley Type VI, a fault-line valley and is structurally controlled being dominated by bedrock and/or colluvial slope building processes (Rosgen 1996, 2006). Stream pattern is controlled by the confined, laterally controlled valley. Rosgen stream type typically found within this valley type is “B”, though on rare occasion the channel gradient increases above 4% indicating a Rosgen A type channel. Site tours of Big Fir Creek showed the

dominant vegetation for this reach is willow and aspen of multiple age classes, which are important for bank stabilization in streams of this class. Small floodplain areas where the channel has access to out of bank flows showed no signs of hoof damage (pugging) from past livestock use. Observations of livestock/wildlife water crossings were present. Crossings were infrequent and the channel bed material of gravel and cobble armors the channel from significant impact. I observed no evidence that livestock trail up and down the channel, nor is there evidence of livestock loafing in the channel from the recent past of grazing management.

15. My field visit to Big Fir Creek indicated multiple age classes of woody vegetation stabilizing the stream banks. Aspen stands had all ages represented from trees less than 5 years old (indicating recruitment without livestock present) to trees in the 5-10 year range, indicating recruitment during the recent past with livestock present. Willows did not exhibit the "mushroom shape" or highlining common of willows that have been over utilized in the past or present by livestock or wildlife. Field photos of Big Fir Creek from 2006 (pre-cattle exclusion) show similar vegetation and physical attributes to those observed in 2019, which calls Kauffman's claim that the habitat has "experienced significant passive restoration" since cattle exclusion into question.

16. Dr. Kauffman's statements that his research and observations of Southeast Oregon grazing allotments over the last 33-year period indicate a general lack of improvement in riparian plant communities, etc. are extremely broad and suggest a general predilection against livestock grazing of any magnitude or under any management regime, no matter how carefully crafted. I can provide more than one example of appropriate livestock grazing on Southeast Oregon riparian areas and Great Basin riparian systems; however the point of this discussion is the Hardie Summer Allotment specifically, which I have already indicated is in very good condition.

Dalton Meadows, NV. 2010 and 2016. Meadow was perimeter fenced to provide control of grazing by wild horses and livestock. Livestock graze meadow every September – November. Healing of meadow surface and reestablishment of native sedges and grasses is apparent.

17. Dr. Kauffman's statement (point 16) claiming that livestock reintroduction will reverse ecosystem function gains from the last five years is an opinion not based on data. PFC assessments indicate the channels have been in proper functioning condition since first assessed in 1998. My observations of Big Fir Creek indicated a riparian plant community that is healthy with multiple age classes of woody plants suggesting grazing impacts have been minimal and have not caused damage.

18. Dr. Kauffman's Point 18: Hart Mountain example again is the tragedy of the commons that all scientists working in rangeland and riparian areas of the west understand. It is not the story of today and to assume that BLM is still operating under this management scenario speaks to the ignorance of the individuals involved or to the utter distain they must have for the ranching community. BLM was established to manage public rangelands for multiple use and one of those uses is grazing that helps sustain the rural populations of the American west. In 1996, BLM formed the National Riparian Service Team to address critical riparian grazing issues and has been partnering with university scientists and ranchers to resolve these grazing issues for

decades. There are many examples where livestock and riparian areas can co-exist. None of us want to revisit the conditions shown in the early photos of Hart Mountain or the ones I provided of Maggie Creek, NV in the 1970 and 80's, however with appropriate management, as is prescribed for the Hardie Summer Allotment, that past will not be repeated. Hardie Summer channels are not the same morphology as Hart Mountain channels.

19. I also wish to quickly note the findings of two recent papers. The first discusses the unintended consequences of habitat loss on private land from grazing restrictions on public rangelands. (Runge 2019). In particular, the paper evaluated whether overly restrictive grazing restrictions on public rangelands could have the unintended effect of increasing the conversion of private land to cropland, resulting in habitat loss for sage-grouse. Through use of a model, the paper found that restricting grazing of public lands could result in greater system-wide fragmentation of sage-grouse habitat form the unintended consequence of habitat loss on private lands. The second paper addressed the effects of rotational grazing management strategies on nesting sage-grouse in the northern Great Plains of Montana (Smith 2018). Among other things, the papers found that there was no evidence that rest from grazing for twelve months or more increased daily survival rates for sage-grouse or nest success within the study area. In addition, the nest success under such conditions was found to be comparable to range-wide averages, leading its authors to suggest that concealing cover for nests is unlikely to be a limiting factor for sage-grouse populations. Based on its findings, the paper's authors suggested a variety of locally appropriate grazing strategies focused on fundamental range health principles may provide adequate habitat quality for nesting sage-grouse.

Executed this 25th day of June 2019.

s/ Tamzen K. Stringham
TAMZEN K. STRINGHAM, Ph.D.

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